

XVII. *Specimen Faunæ Subterraneæ*; being a Contribution towards the Subterranean Fauna, by J. C. SCHJÖDTE. Reprinted from the Transactions of the Royal Danish Society of Sciences, Fifth Series, Division of Natural History and Mathematics, 2nd Vol. Copenhagen, 1849. 4to. (Translated from the Danish, at the request of W. SPENCE, Esq., F.R.S., Vice-President of the Entomological Society of London, by N. WALLICH, M. & Ph. D., F.R.S., V.P.L.S.)

[Read January 6th, 1851.]

AFTER an interval of more than three-quarters of a century, during which our knowledge of existing inhabitants of the Stalactitic caves in Carniola was limited to one single animal, attention has again been directed towards this remarkable zoological subject, by a few solitary communications recently made. To the curious reptile, known since 1768, chiefly under the name of *Proteus*, and since then occasionally found in the subterranean river which traverses the Magdalena cave near Adelsberg, were added, since 1840, two other animals belonging to the *Articulata*, the entire structure of which indicated that they were created exclusively to undergo a subterranean existence. In the course of that year Koch published in his work on the *Crustacea*, *Myriapoda* and *Arachnida*, a figure of *Pherusa alba*, a crustacean of the family of *Oniscus*, discovered in the cave of Adelsberg. Four years later we were surprised by another singular discovery in the Luege cave, of *Anophthalmus Schmidti*, an insect belonging to the *Carabidæ*, allied to the genus *Trechus*, excellently described by the well known German naturalist Sturm.*

It was not only their locality which attracted attention to these animals, though it cannot be denied that the fact was striking enough, that animals should be found to exist under conditions so very unfavourable for the support of animal life; but it was especially the circumstance of their being found to have no eyes, organs so well developed in all the other species of the respective groups to which they belong, which was so remarkable. In the

* *Anophthalmus*. Neue Gattung aus der Familie der Caraben. Mit einer color. Tafel. Nürnberg, 1844, 8vo. Also as an Appendix to the Deutschlands Fauna by the same author, V. Abth. 15 Bd.

long-known cave-animal the *Proteus*, the eyes, if not altogether wanting, are yet so little developed, being concealed under the skin, that beyond the mere perception of light, they must be incapable of receiving any impression of images by means of those organs. It is easy to perceive the connexion which exists between the want of light in the caverns, and the want of organs in their inhabitants by means of which alone light can affect the senses. So long as one form only was known to exist there, inhabiting, moreover, a running stream in the cave, and therefore not exclusively doomed to darkness, this blindness was viewed simply as an exceptional phenomenon, of which there were analogous instances. But on becoming acquainted with other occupants of those caves, not only blind, but in their structure belonging to peculiar forms (genera), the idea arose, that the three animals mentioned, stood related to each other as links of one chain; in other words, they seemed to exhibit themselves as representatives of a possibly numerous, generically consistent, subterranean Fauna, whose common characteristic consists in *blindness*. On the other hand, fresh researches, made by that meritorious collector Ferdinand Schmidt of Schischka, near Laybach, to whom we likewise owe the discovery of the *Anophthalmus*, proved that there were some few other animals in those caves not materially different from the usual forms. Erichson, in his Monograph of the Family of *Staphylinidæ*, has described a new species of *Homalota* under the specific name of *spelæa*, closely allied to *H. elongatula*, Grav., so common all over Europe, and has quoted it as an inhabitant of the cave at Adelsberg.* A species of *Carabidæ*, communicated to collections by Schmidt under the name of *Pristonychus Schreibersii*,† seems to occur only in the Stalactitic caves of Carniola. It deserves to be noticed, that these two animals differ from their allied species by their strikingly minute eyes.

New prospects were further opened in consequence of communications from quite a different quarter. Migratory Indians had long ago, and adventurers and new colonists more recently, visited the immense Kentucky cave, ramified for miles, and known at present under the name of the Mammoth cave. At a distance of about a mile (Danish)‡ from the entrance to the cave, a consider-

* Genera et Species Staphylinorum, p. 107, n. 51.

† I take this species to be *Pristonychus elegans*, Dej. (Species Général des Coléoptères, Tom. iii. p. 59, n. 17.) Dejean got possession of the specimen described by him during his journey in Carniola, without knowing the real habitat of the insect.

‡ Equal to about four English miles.—N. W.

able lake was found in 1841, extending above a quarter of a mile into its numerous branches. In this subterranean sea, which rises and falls according to the varying degree of wetness of the seasons, were found a fish and a crustacean, both colourless, with eyes concealed under the skin, like the *Proteus*. Various communications have been made to periodicals in North America and England concerning the former,* which is introduced under the name of *Amblyopsis spelæus* in the splendid Natural History of New York, published under the authority of that State, and the zoological part of which belongs to James Dekay.† Dr. Tellkamp, a German, who visited the cave several years later, has given a further account of its Fauna since his return to Europe, in two memoirs.‡ According to researches instituted partly by the celebrated J. Müller, this fish is represented as the type of a new family, *Heteropygii*, but nothing of consequence is said as to the anatomy of *Astacus pellucidus*, which name indicates that it is a congener of the river *Crustacea*; an opinion which Thompson had previously pronounced, without, however, scientifically supporting it. Our author has discovered several new *Articulata*, of which he describes the following:—*Adelops hirtus* of the family *Silphidae*, being a new genus and species, which he distinguished from *Choleva* solely by the want of eyes, and which in fact would belong to that genus, unless, which is probable, the essential systematic characters of the animal have been overlooked: *Phalangodes armata*, a small Arachnidan of the family of *Opiliones*, white, blind, differing from the other forms by its aculeated palpi: another small, blind, white Arachnidan, *Anthrobia Mammouthia*, concerning which Dr. Tellkamp's account affords us no means of

* Jeffries Wyman, Description of a *Blind Fish* from a Cave in Kentucky, in Silliman's American Journal for July, 1843; Annals and Mag. of Nat. Hist., vol. xii., 1843, p. 298; Thompson's Notice of the Blind Fish, Cray Fish and Insects from the Mammoth Cave, Kentucky, in Ann. and Mag., &c., vol. xiii., 1844, p. 111. [In this communication Mr. Thompson states that the Crustacean agrees with Milne Edwards's description of *Astacus Bartoni*, an inhabitant of the Delaware and other American rivers, and that it possesses eyes; crickets also (as they were termed) were captured seven miles within the cave. They likewise possess eyes, and approach near to *Phalangopsis longipes* of Serville.—J. O. W.]

† Zoology of New York, or the New York Fauna, by J. E. Dekay, Albany, 1842. 4to. Four volumes have been published; the fourth containing Fishes.

‡ Ueber den blinden Fisch, &c., (on the Blind Fish of the Mammoth Cave in Kentucky, with Observations on some other Animals which live in them), in Johan Müller's Archiv. 1844, p. 381, tab. ix.; Beschreibung, &c. (Description of several Articulate Animals found, &c.) In Erichson's Archiv für Naturgesch. 10 Jahrg. vol. i. p. 318, tab. viii.

forming any conclusion as to its proximate systematic relations. This last defect applies particularly to the fourth, *Triura cavernicola*, which appears to belong to the order of *Amphipoda*, and to have a most remarkable structure. Dr. Tellkampff has likewise found a new species of *Anophthalmus*, extremely like that of Europe, but characterized as different by Erichson, who calls it *A. Tellkampffi*. Finally, a sort of fish different from *Amblyopsis*, a grasshopper belonging to the genus *Phalangopsis*, and flies of the genus *Anthomyia*, are enumerated as found in the cave.

At the time the account of these discoveries reached Copenhagen, I was preparing for a scientific tour through a great part of Europe. One of my objects was to visit the Alps, and make collections for the Royal Museum of Natural History, of which the *Insecta*, *Arachnida* and *Myriapoda*, are entrusted to my charge, divisions in which it is very poor in European species: I determined, therefore, to arrange my plans in such a way, that I might connect my tour to the Alps with a visit to the caves in Carniola, and accordingly I selected the eastern portion of the Alps for my researches.* After remaining among these during the summer of 1845, I arrived at Adelsberg early in the autumn.

I examined four caves; namely, that of Adelsberg, the Magdalena and Luege caves, all in the neighbourhood of Adelsberg, and the Corneale cave at Trieste. The result was, first, that I found every one of the animals, known before as inhabitants of those caves; secondly, that I discovered more than twice as many new kinds, among which there are five types of new genera; and finally, as these latter concern a part of the subterranean Fauna hitherto almost unknown, I believe I can offer materials for a systematic inquiry into the whole phenomenon. I will now proceed to describe what I have observed, and in conclusion I will venture to offer some remarks on the character of the subterranean Fauna.

The entrance into the first two of the four Stalactitic caves just mentioned, is horizontal, and through the two largest flow rivers; namely, the Pojk through the Adelsberg cave, and the Magdalena through the cave bearing that name. The Luege grotto is the most considerable of four grottos, placed almost perpendicularly one above the other; two underneath, and one above the castle of Luege, so famed from romantic traditions, and which itself

* My collections in the said classes made on the Alps, and during the subsequent part of my journey, especially in the Roman Campagna, Calabria and Sicily, amount altogether to about 70,000 specimens, which have safely arrived at Copenhagen, and have been deposited in the Museum.

stands in the fourth cave. The lowermost is the bed of a river, covered above, and accessible only for a short distance; the uppermost two are nothing but slight excavations into the perpendicular rock, and it is only in the third grotto from below that considerable Stalactitic formations exist and are in progress. The grotto Corneale has its entrance nearly vertical, and contains no running stream of any size. These cave-localities exhibit nothing peculiar as respects their Fauna; a moist air and low temperature are the leading features of the Stalactitic caves, with the consequent nearly total absence of vegetation. The only plant which I observed was a sort of fungus, *Byssus fulvus*, L.* I found this growing on bits of wood scattered about, on bridges, railings and fragments of torches; extending itself sparingly on the columns, especially such as are stunted in their growth.

On searching along the walls within the entrance of the caves, among the rubbish and the vegetable debris along the sides of the river, we meet with a considerable number of *Insecta*, *Myriapoda*, *Arachnida*, and *Crustacea*, of various families, which shun daylight; being such species only as inhabit promiscuously other places, provided they are moist and feebly illumined. We find species of *Pterostichus*, *Pristonychus*, *Amara*, *Quedius*, *Homalota*, *Omalium*, *Hister*, *Trichopteryx*, *Cryptophagus*, *Atomaria*, *Ptinus*, *Ceraphron*, *Belyta*, a grasshopper of the Locust family, which could not be quite determined, as it was only seen in the larva state,† *Trichoptera*, *Sciara*, *Psychoda*, *Phora*, *Heteromyza*, *Sapromyza*, *Tomocerus*, *Linyphia*, *Gamasus*, *Cryptops*, *Julus*, and *Asellus*. In proportion as we recede from the entrance the number of species as well as individuals greatly decrease, and at the distance which entirely excludes the light, only single individuals are found. In the deepest recesses these species are entirely wanting, except some few which have been transported by the current; only a few *Diptera* are found, namely, a species of *Phora*, very near *P. maculata*, Meig., *Heteromyza flavipes*, Zett., and *Sapromyza chrysophthalma*, Zett., extending also very far into the caves, even to the remotest accessible places in the Adelsberg cave, more than half an hour's walk from its entrance. Dead moths are occasionally found far in the caves, being left there by the bats; and likewise accidental specimens of the parasites of the latter.

Of the five earlier known animals which inhabit these caves,

* Kindly determined by Prof. Liebmann.

† I found this species, likewise in the larva state, in the following summer, in the artificial grotto at Syracuse, called *l'orrechio di Dionisio*; also in most of the adjacent grottos.

I found, *Pristonychus elegans*, Dej., rather frequently, and *Homalota spelæa*, Er., in considerable numbers; the former in all the Luege grottos, the other in the Magdalena and Adelsberg caves. They may be observed under stones and in loose earth, close at the entrance, where a dim light is admitted; afterwards, as we penetrate deeper into the darkness, they become more frequent; after which they again disappear. I, however, saw solitary specimens of both, in the innermost portion of the Adelsberg cave, ascending on recent columns to a height of several ells above the floor of the cave. *Anophthalmus Schmidtii* appears to be very rare indeed; and I have only met with two specimens in the innermost part of the Luege grotto among decayed wood.* *Pherusa alba*, Koch, was very common in all the caves, showing itself soon after entering the dark part. *Hypochthon (Proteus) anguinus* was found here and there in the Magdalena river, in the innermost part of the cave of that name, and may almost always be purchased of the conductors. On perceiving the torchlight it usually remains quiet in the water; but the first attempt to catch it is rarely successful. The moment you bring your net under it, the animal suddenly darts off with a serpentine motion to a distance of several ells; after which it remains again stationary in the water, when the attempt is more likely to succeed.

I now proceed to give an account of the new cave-animals.

The family of *Silphidæ* is increased by two remarkable new genera. Of one of these, *Bathyscia*, I am acquainted with two species, both very small, blind, and without wings; but otherwise so perfectly like *Choleva* in appearance that, without the most careful examination, they might be referred to that genus. They differ essentially in their toothed mandibulæ, the absence of the horny tooth, which in *Choleva*, *Colon*, and *Silpha*, terminates the masticatory lobe of the maxillæ; and, more strikingly, by their four-jointed tarsi of the anterior legs, a proportion which here occurs for the first time in one of the members of the family *Silphidæ*; moreover, the labellum† is much more developed, and

* In a small, completely dark space in the cave where the castle stands, behind it, and separated by a brick wall, Mr. Hellmuth von Kiesenwetter, who accompanied me during my tour in the Alps and to the caves, also found a specimen of this species.

† I propose this term for the coriaceous ciliated appendage, which projects in many families, in a more or less degree, from the under surface of the upper lip. I am aware that Erichson uses the word *Parachilia* for similar parts in the *Scarabæides*, in his most recent work (*Naturgeschichte der Ins. Deutschl. iii. p. 553*); but this term, being founded on the assumption that these parts have the same re-

the first joint in the tarsi of all the legs not longer than the following.

The two species resemble each other much, but may be easily discriminated by the structure of their antennæ and labial palpi. In the smallness of their size and their habit they resemble the *Ptilia*, having the same darting motion, which is exceedingly rapid. I met with a number of specimens of *Bathyscia byssina* in the inner part of the Adelsberg cave, occupying the small clusters of *Byssus fulvus*, on the short and stunted columns. The other species, *B. montana*, is common in the Luege grotto, among loose earth and little stones along the walls; but I have found it also, and in far greater quantities, among moist leaves in forests, on shady rocks near the castle Veldes, on the Carniolan Alps. I examined this species anatomically during my stay at Veldes; but as we do not possess more than the few observations I published some years ago* respecting the internal structure of *Choleva* and *Colon*, with which *Bathyscia* is to be compared, there is no need of my saying more on the subject for the present, except that *Bathyscia* agrees with these genera in the characteristic want of a cœcum, but differs strikingly in the following points: the malpighian vessels have the same angular nerve and thickened end as that which, on another occasion,† have been pointed out by me as characteristic of some families of the division of clavicorn beetles; the pair of spermatic vesicles are short, wide and clavate, not long and rolled up; the testicular vesicles are small and very numerous, and they form together a globular body.

As yet it is doubtful what relation *Bathyscia* has to Tellkampff's genus *Adelops*. According to the character he gives of this form, it differs from *Choleva* only by its want of eyes, and would accordingly belong to that genus, provided his account is correct, and no essential character has been omitted. The similarity of locality, and the analogy existing between the European and North American Fauna, which, as far as regards cave-animals, is strikingly exemplified by the similarity between the *Anophthalmi* of these two countries, would seem to indicate that *Adelops* ought to merge into *Bathyscia*. This supposition is somewhat supported by Tellkampff's figure, in which the first joint of the feet is repre-

lation to the upper lip, as the supplementary tongues [paraglossæ] have to the under lip, certainly can have no application as far as regards the *Silphidæ*, where it is clear that both lobes are simply a continuation of one single organ.

* Germar's Zeitschrift für die Entomologie, Bd. V. 1844, p. 475.

† Kröyer, Naturhistorisk Tidsskrift, Ny Række, 1ste B. p. 396.

sented as shorter than in *Choleva*; but the greater size of the North American species, and Erichson's remark, in a note added to Tellkamp's account, that it is principally the want of eyes which distinguishes *Adelops* from *Choleva*, is against this supposition. On the other hand, new doubts and conjectures arise from the information of Erichson, that the museum at Berlin possesses, besides the North American *Adelops*, two other species, one from Carniola, and the other from Sicily; for, one cannot help thinking that the species from Carniola, said to have been communicated by Schmidt of Schischka, may prove to be *B. montana*, which is frequent in that locality, and where Schmidt had often made collections. In that case it may be suspected that Erichson was prevented from closely examining the animal, either by the paucity of specimens or some other cause; so that it still remains doubtful as yet whether his two European species agree generically among themselves, or with *Adelops*.

BATHYSCIA.

Ordo ELEUTHERATA—Familia SILPHÆ.

Oculi nulli. Mandibulæ dentatæ. Maxillæ mala interiori spinulis terminata. Palpi maxillares articulo ultimo conico, acuminato. Antennæ longiores, extrorsum crassiores, articulo octavo contiguis minore. Mesosternum carinatum. Tarsi antichi 4 articulati, posteriores 5-articulati, omnes articulo primo subsequentibus haud longiore.

Βαθῦς; σκιά.

BATHYSCIA BYSSINA.

Breviter ovata, valde convexa, fusco-ferruginea, fulvo-pubescent, articulis palporum labialium longitudine subæqualibus; nono antennarum articulo octavum ter superante. Long $\frac{4}{3}$ lin.

BATHYSCIA MONTANA.

Ovata, convexa, ferruginea, fulvo-pubescent; articulo secundo palporum labialium brevissimo; nono antennarum articulo octavum dimidia parte superante. Long. $\frac{5}{18}$ lin.*

The next genus, *Stagobius*, is so peculiar in its structure, and so unlike all the *Silphæ*, and yet possesses nothing in its habit to remind us of any other family, that we must rigorously adopt

* For the full details (in Latin) of the generic and specific characters of these and the subsequent species, the reader is referred to the original work.—W. S.

systematic characters, in order to settle its natural place. The connate swollen and bladder-formed elytra form a curious contrast with the blind, long, narrow and depressed head and the equally long, narrow, almost cylindrical prothorax, and the strangeness of the figure is rendered still more complete by the slender and elongated shape of the limbs. However, a combination of the following characters will only admit of the animal being compared with *Silphidæ*, *Anisotomidæ* and *Scydmanidæ*. Seven abdominal joints; the first being hidden by the hind hips; only the last two completely movable. Fore coxæ conical, freely projecting from their articulating cavities. Antennæ 11-jointed, clavate.

This last-mentioned family has been adopted by a number of authors since the time of Latreille, but remains still without being properly confirmed. I have in a former memoir* endeavoured to show that it recedes from the rest of Latreille's Clavicorns by its anatomical character, and therefore confine myself at present to the following observations.

The parts of the mouth are formed according to a peculiar type, approaching to no other than that of the *Pselaphidæ*. The upper lip wants the labellum, but is furnished with spines; the mandibles are falcate, with sharp teeth, the molar plate small, slightly grooved; maxillæ short, with broad stems and palpi, with extraordinarily large joints; the terminal part of the external maxillary lobe is quite horny, except along the *inner* suture. On account of the greater development of the divisions of the maxillæ, the faucal margin becomes deeply excavated on each side of the mentum, which is very small, and is thus supported by a more or less protruding part of the throat. The scapes of the labial palpi, which in the *Silphidæ* and *Anisotomidæ* are nearly concealed by the mentum, are protruding, free and connate throughout their whole length in the *Scydmanidæ*. The short tongue is quite horny, with a spinose scarcely incised apex; the paraglossæ, on the contrary, are much more developed than in the two families mentioned, free at the apex, and armed along the inner margin with a row of pectinate teeth; the middle joint of the lingual palpi is of considerable size, intumescent, with a cuspidate terminal joint. It is, therefore, principally the third pair of the parts of the mouth, which presents itself by its form as the diagnosis; and, in the second place, the form of the hinder hips, which are conical, and removed from each other by the greater lateral development of the metasternum. The congregated structure of the eyes, and the

* Krøyer, Naturhistorisk Tidsskrift, Ny Række, B. 1, p. 394.

number of the joints of the feet, may be taken as secondary characters; but they are of no importance, least of all the last mentioned.

According to what we have advanced, this family may be designated in the following manner, in contradistinction to the *Silphidæ* and *Anisotomidæ*:—

Scydmænidæ. *Antennæ* 11-articulatæ, clavatæ. *Oculi aggregati*. *Stipites palporum labialium maximi, detecti, connati*. *Ligula parva, cornea, paraglossis liberis, elongatis, pectinatis*. *Coxæ anticæ conicæ, exsertæ*. *Coxæ posticæ conicæ, distantes*. *Tarsi* 5-articulati. *Abdomen segmentis ventralibus septem*.

The new genus cannot be admitted into this family, because the parts of its mouth, as will be seen below, are totally different from the type of *Scydmænidæ*, and its hinder coxæ are transversal, moveable on their axis. It only remains, therefore, to compare it with the *Silphidæ* and *Anisotomidæ*. The most recent diagnosis of the first of these families is, according to Erichson:*

Maxillæ mala utraque coriacea aut membranacea. *Antennæ* 11-articulatæ, clavatæ. *Tarsi omnes* 5-articulati. *Abdomen segmentis sex compositum*.

This diagnosis in its totality is obsolete; nor can we consider any of its characters as quite correct. The first is too general, and therefore insufficient; the second excludes *Necrophorus*; and the third is cancelled by the genus *Bathyscia* proposed above. It is only the fourth character which can be retained, remembering, however, that Erichson does not include the first joint, which is concealed by the hinder coxæ.

Erichson proposes the following diagnosis for the *Anisotomidæ* in his last immortal work:†

Antennæ 11-articulatæ clavatæ. *Coxæ anticæ exsertæ, conicæ, posteriores approximatae*. *Trochanteres postici simplices*. *Abdomen segmentis ventralibus sex*; and he adds the remark,‡ that the *Anisotomidæ* are so nearly related to the *Silphidæ*, that it is difficult adequately to discriminate between the two families. He mentions that the trochanters of the posterior supporting legs are *fulcrantes* ("stutzend") in the *Silphidæ*, simple ("einfach") in the *Anisotomidæ*; that the middle coxæ in the latter are more enclosed in the cavities of the joints; and that the episterna of the post-pectus (parapleura) are totally, or for the greater part, con-

* Die Käfer der Mark Brandenburg, Band 1, p. 223.

† Naturgeschichte der Insecten Deutschlands, Abth. 1, B. 3, p. 41.

‡ Ibid. p. 43.

cealed under the recurved margin of the elytra. He has since* given an account of the difference between the larvæ of *Leiodes* and the hitherto known larvæ of *Silphidæ*.

We find, according to the subjoined details of structure, that all the characters exist in *Stagobius* which, as has been said already, must be considered as common to the *Silphidæ* and *Anisotomidæ*, in contradistinction from the *Scydmænidæ*. The anterior legs are four-jointed, which is the case also in *Bathyscia*, which is in all respects a genuine form of the *Silphidæ*. It has the same type of the parts of the mouth, the antennæ, the coxæ, and the hinder portion of the abdomen; in a word, it possesses the identical essential character, with this notable exception, however, that the post-pectus, which is more developed in breadth, though not to that degree as in *Scydmænidæ*, forces the hinder coxæ (quite resembling, in their transversal position, those of the *Silphidæ*) asunder from each other. If to this is added, that this proportion, as far as I know, always represents a very different distribution of muscles in the metathorax, and implies in this case a more or less slow motion, while it renders running quite impossible; if it is further remembered, how deeply this single circumstance must influence all the functions of life of the animal; and lastly, if its very strange habits are considered, surely there are grounds for regarding the animal as the type of a peculiar family. In fact there can be no doubt that this is the correct view, if the family of *Anisotomidæ* maintains its place as a family independent of the *Silphidæ*, for the deviations of *Stagobius* from the latter are of far greater weight than those which separate the *Anisotomidæ*. But I cannot admit at present that the slight differences, pointed out by Erichson, go further than to separate the *Silphidæ* and *Anisotomidæ* as two different groups of the same family; and, accordingly, I do not place any great value on the deviations of this new form. It must be recollected that we are still very deficient in our knowledge of the series of the forms here mentioned, and that all that can be expected as yet is a modified view of their internal and external systematical relations.

* Erichson, Archiv für Naturgeschichte, 13 Jahrg, 1847, B. 1, p. 285. The point upon which he has laid the greatest stress is this: that the mandibles in the *Anisotomidæ*, and their larvæ, are furnished with a molar plate, whereas in the *Silphæ* there are none. This distinction, according to my observations, does not hold good; for *Choleva* has the molar plate ten times longer and stronger than the *Anisotomidæ*.

Some parts of the structure peculiar to this remarkable animal, demand additional notice, with reference to its mode of existence. On a former occasion* I have pointed out that the organs termed *onychia* exist more extensively among the *Eleutherata* than was hitherto supposed to be the case, and that they are found also in *Silphidæ*. They are developed in a peculiar manner in *Stagobius*, where the proper, horny, basilar-part, is greatly withdrawn, while the two bristles, at its end, are much elongated and directed backwards, towards the base of the tarsus. There exist, besides, two other setæ, equally moveable, but having a forward direction; these, together with the others, form a cross of four long setæ, which constitute the longest of a system of moveable bristles of various lengths; two pairs being inserted at the end of the joint of each foot, one pair above, the other underneath. The intention of this whole apparatus, and the very long, slender and sharp claws, as well as the elongated and attenuated tarsal joints, is very manifest in an animal, destined to roam amid the vertical stalactites, in darkness and in blindness. It is more difficult to comprehend the apparent disproportion of the prothorax, as compared with that part of the body directly behind it. I account for it in this way: it is obvious that it must be difficult for so slow and weak an animal, to procure adequate sustenance in a locality like that which it inhabits; and that, probably, it is occasionally without the means of procuring food, during a long period. The spacious vault under the elytra seems to indicate, that possibly an accumulation of fat takes place under favourable circumstances, on which the animal subsists in times of scarcity. In the specimens which I examined, the abdomen occupied only a small portion of the vault, and I consider them, therefore, to have been in a lean state. The slowness of motion, and the small respiratory foramina, are in favour of this view; for we may, I think, consider it as a fact, that the respiration of insects, is in a direct ratio to the intensity of their motion, but in an indirect ratio to the mass of fat. The necessity of a spacious abdomen, and the movements consisting of long steps, determine the necessity of a slender prothorax, which can supply the absence of freedom of motion, and afford adequate space for the insertion of legs, fitted to take long strides.

My first specimen of *Stagobius troglodytes*, as I call the species, was found seated about ten feet from the ground, on one of the stalactites, in an inner compartment of the Adelsberg cave.

* Kröyer, l. c., vol. ii. p. 360.

I afterwards found a second in a similar locality there, and a third in the Magdalena cave; the two latter nearly twenty feet above the floor. These were the only specimens which I met with in a living state; but we may conclude from the many remains of dead specimens, found in the breaks of the columns, that the animal is common at other seasons; for its skin may long be preserved in the cool air of the caves, although it is at length covered by the calcareous deposit. The animal moves slowly and cautiously, supported on its long legs, as if on stilts; it stands still the instant that light, or rather the sound of approach, reaches it, when it crouches down and remains immoveable, with erect antennæ and stretched out legs, unless it is touched. Many of the remains were dispersed in such a manner, that there can be no doubt of the animal being killed and devoured by animals of prey, which, it may be easily conjectured, are the two Arachnidans subsequently described, which, it will be seen, are well fitted for hunting.

STAGOBINÆ.

Ordo ELEUTHERATA. SILPHARUM Familiæ *Tribus* nova.

Coxæ posticæ distantes.

Prothorax subcylindricus.

STAGOBIVS.

Oculi nulli. Maxillæ mala interiori spinulis terminata. Palpi maxillares articulo ultimo conico, acuminato. Ligula membranacea, apice acute emarginata; paraglossis membranaceis, breviter ciliatis, ligulam haud superantibus. Antennæ elongatæ, graciles, extrorsum crassiores, articulis clavatis, octavo contiguus minore. Pedes elongati, gracillimi; tarsi filiformes, setis longioribus, antici 4-articulati, posteriores 5-articulati, omnes articulo primo elongato, unguiculis scitisque onychii terminalibus elongatis.
Στὰξ, βίωω.

STAGOBIVS TROGLODYTES.

Fusco-brunneus, capite thoraceque obscurioribus, glaber, lævis, nitidus, scutello, coleopteris ventreque minutissime reticulosis punctisque impressis remotis, obsoletis. Long. $2\frac{1}{2}$ —3 lin.

In the inner cavities of the Adelsberg cave, on clusters of *Byssus fulvus*, I found a remarkable new species of the order

Thysanoura,—white, of considerable size, and approaching to the genus *Anurophorus*, Nicolet, on account of its want of a scaly covering, its rudimentary apparatus for jumping, the structure of its antennæ and limbs, as well as the number and position of its eyes. The antennæ are strikingly different from those of the well-known species, being longer than the head; the legs, besides, are longer and more slender; and the structure of the pectoral segments is remarkable, each being subdivided by a stricture into two unequal parts. It is exceedingly difficult to discover the eyes, and it was only after many attempts that I ascertained their existence, form, number and position, by the aid of Lieberkühn's mirror and a powerfully reflected lamp-light. They are snow-white, fourteen on each side, and placed nearly as in *Anurophorus fimetarius*.* Their colour plainly indicates their being rudimentary, and unfit for sensation.

Smaller specimens, found together with the larger ones, differed, besides their size, by the short antennæ having a large terminal joint, and the pectoral joints being less strongly constricted; I consider them to be a younger age. Conjointly with these two forms I met with a third, much smaller, linear, with very short antennæ, very feeble traces of constriction in the pectoral rings, and the abdomen furnished at the end with two small hooks. This small form, I think, is the larva state.

ANUROPHORUS STILLICIDI.

Niveus, oculis viginti-octo; antennis capite duplo longioribus; segmentis thoracis bilobis.

Long. $1\frac{1}{2}$ lin.

Many of the stalactites have lateral projections, arising from the inequality of the droppings from which they have originated. From these projections water drops down, which strikes on those below; and this is particularly the case, where the stalactites have reached the roof of the vault. Carbonate of lime is in time deposited between the adjoining projections, which thus gradually approach each other, beginning from without, so that a small recess is often formed between two projections, preserving its outlet, until their whole breadth is united. These little cavities are inhabited, in the Magdalena and Adelsberg caves, by two remarkable blind Arachnidans, each the type of a new genus.

* Nicolet, Recherches pour servir à l'Histoire des Podurelles, pl. 2, fig. 19.

One of them belongs to the order *Araneæ*, and is connected with the few known genera having two pairs of respiratory orifices, of which only the first pair contains air-gills, the other containing tracheæ. It is besides, in other respects, nearly allied to the genus *Dysdera*, though in its habit it still more resembles the otherwise far removed genus *Desis*.* Besides its want of sight, it differs from *Dysdera*, by various discrepancies in the parts of the mouth, the proportions of its limbs, and the naked abdomen.

STALITA.

Ordo ARANEÆ. Familia DYSDERÆ.

Oculi nulli. Antennæ mandibulares subporrectæ, conicæ, ungue sublateraliter inflexo. Maxillæ mala elongata, apice oblique truncato, margine interiori dense barbato. Labium sternale elongatum, angustum, apice subrotundato. Pedes elongati, subæquales, tertii paris breviores. Abdomen nudum.

Στηλίτης.

STALITA TÆNARIA.

Pallide ferruginea, antennis palpisque fusciscentibus, abdomine animalis vivi niveo: nitida, subglabra, palpis pedibusque spissius pilosis. Long. 3 lin.

The other genus, of the order of *Solifugæ*, is a colossal form of the family of *Obisia*, being closely allied to *Obisium*, though apparently differing by its remarkably slender and elongated limbs and palpi, the rudimentary state of the horny abdominal scales, its want of eyes, and, lastly, its remarkable size.

Both these Arachnidans are rust-coloured, with a white abdomen; they are swift animals, readily escaping pursuit, unless they are caught at a distance from their places of resort.

BLOTHRUS.

Ordo SOLIFUGÆ. Familia OBISIA.

Oculi nulli. Pollex antennarum mandibularium appendice nulla. Cephalothorax integer. Pedes elongati, gracillimi; tibiæ anteriores biarticulatæ; femora posteriora sutura ante medium

* At least the only known species, *Desis dysderoides*, Walck. (Hist. Nat. des Aptères, i. p. 610), which is identical with the original specimen in the Royal Museum of Natural History, of *Aranea maxillosa*, Fabr. (Entom. Syst. ii. p. 411, n. 17.)

divisa spuria; tarsi omnes biarticulati. Abdomen membranaceum, scutis corneis obsoletis. Corpus setulosum, setis simplicibus.

Βλωθρός, ἂ βλώσχω.

BLOTHRUS SPELÆUS.

Pallide ferrugineus, manibus obscurioribus apice fusciscentibus, abdomine animalis vivi eburneo. Long. $2\frac{1}{2}$ — $2\frac{3}{4}$ lin.

In places of the caves, where water drops down direct upon the floor, small collections of it take place, which form a deposit of crystals of carbonate of lime at their bottom. In these pools in the Luege and Adelsberg caves, we find a snow-white, blind, crustaceous animal of the family of *Amphipoda*. It has a slender smooth figure, without any spines, and so nearly allied to *Gammarus*, that it would belong to that genus, were it not for its want of eyes, and the following very striking character:—The last abdominal feet, which are nearly void of spines, have the inner style rudimentary, while the outer is not only greatly elongated, especially in the male; but what is more remarkable, it is two-jointed. I consider this last circumstance as decisive, being supported in this view by some expressions of our celebrated Carcinologist (M. Kröyer), concerning those species of *Gammarus*, in which the style of the second joint of the sixth pair of abdominal legs is rudimentary, or entirely wanting; such as *G. Olivii*, *podager*, *Dugesii*, *brevicaudatus*, Milne-Edw.,* *affinis* and *pungens*, Milne-Edw.,† *dentatus*‡ and *anisochir*, K.§ He considers this structure to be of weight in a physiological point of view, as a generic character among animals, whose motion in a great measure consists in jumping;|| but in our new species, this apparatus for jumping differs still more, so as to resemble almost a rotatory contrivance. Another deviation deserving notice, is the very slight development of the appendicular flagellum of the uppermost antennæ, which consists of only two joints, and protrudes very little beyond the first joint of the flagellum; yet great weight cannot be attached to this structure, especially as in some degree it occurs in several

* Extrait de Recherches pour servir à l'Hist. Nat. des Crustacés-Amphipodes (Annal. des Sc. Nat. tom. xx. p. 367—372).

† Hist. Nat. des Crustacés, tom. iii. p. 47.

‡ Kröyer, Naturhist. Tidsskr. vol. iv. p. 159.

§ Ibid. New Series, vol. i. p. 327.

|| Kröyer, lo. cit. p. 326.

species of *Gammarus*, such as *brevicaudatus* and *Othonis*, M.-Edw.*

NIPHARGUS.

Ordo AMPHIPODA—Familia GAMMARI.

Oculi nulli Antennæ superiores inferioribus longiores, flagello appendiculari minuto, biarticulato. Pedes ultimi paris stylo anteriori brevissimo, exteriori valde elongato, biarticulato.

Νίφαργος.

Niphargus Stygius.

Elongatus, summa altitudine a dorso segmenti tertii ad inferiorem epimeri marginem quintuplo longior, subcompressus, crassitie maxima segmenti tertii altitudinem haud æquante, lævis, carinis dentibusque carens omnino. Color niveus. Long. 5—7 lin.

The commonest among the proper cave animals, is a species, which, not confining itself to the columns in the depths of the caves, is found wandering about on the walls, on the columns near the outlet, which have become blackened by the torches, and also along the frequented paths and roads; and it is the only animal among those treated of here, which was known before, though imperfectly only. It is a white crustacean of the family of *Oniscidæ*, and has been figured by Koch under the name of *Pherusa alba*.† He had, however, defective specimens only, without antennæ or the last pair of abdominal legs, and had to rely on the want of eyes for his generic character. On referring to Koch's work on the subject, Erichson‡ has subsequently added some remarks, derived from his examination of better preserved specimens in the Berlin Museum, concerning the appendage to the last pair of abdominal legs, and the number of joints in the flagellum of the antennæ, which he rates at eight. As this is all the information we have hitherto possessed as to this animal, I have availed myself of the present opportunity of entering into a detail of its structure.

According to M. Koch's division of the family of *Oniscidæ* (*Cloportides*, Lat.), founded on the structure of the last pair

* Annal. des Soc. Nat. tom. xx. p. 373. Milne-Edwards mentions that the appendicular flagellum is three-jointed.

† Deutschlands Crustaceen, Myriapoden und Arachniden, 34stes Heft. 1840.

‡ Archiv für Naturg. 1841, vol. ii. p. 252.

of abdominal legs, our animal belongs, as observed already by Erichson, to the middle group (the family of *Oniscidæ*, Koch), characterized by the oval or lanceolate form of those legs, and otherwise corresponding entirely with the almost identical division of *Porcellionides* of M. Milne-Edwards. Among the genera founded in this group by Latreille and Brandt, which differ only in the number of joints of the outer flagellum of the antennæ (one, two or three), *Pherusa* maintains its place in many respects. Instead of one single, or only a few joints, which in point of form or size do not contrast with the outer joint of the stalk, we find here a very developed flagellum, having a larger number of short joints (eight, to twenty). The entire form of the animal is slender, the corners of the hindermost of the thoracic segments are considerably elongated, especially in the male, without the abdomen being enclosed by the seventh thoracic segment, as is usually the case; on the contrary, it is quite free, more than half the length of the thorax, receiving a still more determined shape, from the unusual length of the two first joints; these, as well as the succeeding joints, differ in shape among themselves, as well as from the thoracic joints; the posterior corners of the third of the abdominal segments, in the male, being much elongated externally and backwards. The structure of the limbs is in uniformity with the slender form of the body, the first seven pairs of legs being very delicate, and increasing gradually in length from before, so that the last pair is very much longer than the first, which is the reverse of what is the case in the known genera. The outer joints of the last pair of abdominal legs is subulate, and exceeds in length the abdomen.

The following points remain to be noticed, being different from the other genera of the group. The middle of the three lobes, which seem to terminate the head anteriorly in these genera, may be said to be deficient here, inasmuch as it does not, as usual, form a projecting border, but is vaulted downwards with a gentle curve towards the clypeus, above which it is bordered by a strongly arched, slightly elevated line. All the parts of the mouth are remarkably slender. In the sinus of the masticatory side of the mandibulæ are found four movable appendages; the first of these is thick, with a naked, toothed joint; the other three elongated, nearly filiform, slightly hairy on the anterior surface. The first pair of maxillæ have the anterior lobe at its apex furnished with three appendages, instead of a short one; they are long and slender, nearly lanceolate, and furnished with longish lateral hairs. The palpi and lobes of the maxillary feet are unusually developed, and

both are dense and finely ciliated, but without scattered spines; the lobe has at its apex a minute, sharp, and slightly hairy appendage, and a delicate spine. The outermost joint or claw of the thoracic legs, wants the little appendage on the inner side, near the apex; but it is divided into two joints, of which the uppermost is densely bristly and furnished outwardly with a peculiar little apparatus, consisting of two threads, united at the base in a common sheath, but flabelliform and incised at the end.

The want of eyes, in addition to the above peculiarities, must assuredly be considered as differences from the known genera of the group, far more significant than the characters, which separate those genera among themselves. I hesitate not, therefore, to regard the animal as a well-founded genus. The peculiarity in the structure will be understood without difficulty. Having a much more humid locality than *Oniscus*, *Porcellio* and the other *Oniscidæ*, and compelled to seek for nourishment in the dark, we easily comprehend the intention of its general slenderness of shape, the more free abdomen, and the longer legs, especially developed behind, as adapting it for a higher degree of mobility. The flagellum of the antennæ approaches accordingly nearer to the structure, which we find among the *Ligiæ* and the other groups of aquatic animals; while the fanshaped, very flexible apparatus appended to its feet, appears well suited to support its progress on the most frequently perpendicular and wet sides of the caves and the stalactites.

Among the characters in the diagnosis, the first two are sufficient to separate the genus from the earlier ones of the group; but some of the others may have to be removed in case other species should be discovered. When it will be seen whether or not the genus occupies the same position in the group, with regard to the difference among its species, as the other genera, whose species, like what occurs in all terrestrial *Articulata*, are so closely allied to each other, that they differ only in colour, painting, covering, sculpture, and single little inequalities in their forms.

As the name applied by Koch has been repeatedly used before, even in the same class of animals, I propose a new generic name.

TITANETHES.

Ordo ISOPODA—Familia ONISCI—Tribus ONISCINI.

Oculi nulli. Flagellum antennarum exteriorum setaceum, multiarticulatum. Mandibulæ appendicibus quatuor, anteriori nuda, dentata, posterioribus æqualibus, filiformibus. Mala interior maxillarum prioris paris appendicibus munita tribus,

elongatis, pennatis. Mala pedum maxillarium elongata, appendiculata. Pedes (sic dicti) thoracici graciles, longitudine per paria crescentes; unguiculis biarticulatis appendiceque instructis gemina flabellata. Posterior abdominis portio libera, elongata. Pedes abdominales ultimi paris articulo exteriori styliiformi, elongato.

Τιράν, — ἦθης.

Titanethes albus.

Oblongo-ovatus, posterius attenuatus, convexiusculus, niveus, unguiculis apicem versus rufuscentibus, lævis; caput, thorax, segmentaque prioris abdominis portionis superne ad latera marginemque posteriorem tuberculis adspersa minutis, rotundatis, inæqualibus. Long. 4—7 lin.

We may with propriety apply the collective term *Subterranean Fauna* to those animals, which exclusively inhabit caves, and are expressly constructed for such habitations. Still there is nothing in this name, which would indicate that these animals have any claim to be considered as a separate group, beyond the mere peculiarity of their common place of abode. I have endeavoured, but in vain, after completing my examination of them, to collect the impressions left on my mind by their various peculiarities, and to estimate the extraordinary changes which take place in regard to the more or less wide or narrow systematic groups to which each of the forms belong, with the view of ascertaining whether or not the animals might constitute some higher faunal unity. While a few of them possess such an extraordinary structure, as to stand in no comparison with those animals which inhabit the light, there are others, forming only more characteristic links in the groups of animals more or less shy of light, of which many are found common in the localities of the caves; and some belong to genera having a wide local, as well as geographical, extension. We are accordingly prevented from considering the entire phenomenon in any other light than something purely local, and the similarity which is exhibited in a few forms (*Anophthalmus, Adelops, Bathyscia*), between the Mammoth cave and the caves in Carniola, otherwise than as a very plain expression of that analogy, which subsists generally between the Fauna of Europe and of North America. Besides, it is clear to me, that the Fauna of the caves of Carniola consists of two divisions, of which the essential character is referable on the one hand to the dark locality, and on the other to the

additional confinement to stalactitic formations; as yet we are not able rigorously to discriminate between the two. We shall accordingly look upon the subterranean Fauna, or more properly Faunas, as small ramifications which have penetrated into the earth from the geographically-limited Faunas of the adjacent tracts, and which, as they extended themselves into darkness, have been accommodated to surrounding circumstances. Animals not far remote from the ordinary forms, prepare the transition from light to darkness. Next follow those that are constructed for twilight; and last of all those destined for total darkness, and whose formation is quite peculiar. Among these, some are adapted for special localities, those which inhabit dry localities or detached little reservoirs being totally blind, while others, destined for running streams, have eyes of imperfect construction, so as to receive the impression of rays of light, but no proper image of illuminated objects. We may therefore with tolerable precision arrange the inhabitants of caverns under the following heads:

Shade-animals.—Extensive genera and species, inhabiting caverns near their entrance, and, generally, all cool, shady and moist localities. Of these, those that fly, occasionally enter far into the caverns (*Antliata*).

Twilight-animals.—They belong to widely-spread genera, but are peculiar to the caves, and distinguished by their small eyes. They are principally found near the entrances to the caves, but proceed deeper into the darkness than the shade-animals, and although wingless, they penetrate often the whole extent of the dark space.—(*Pristonychus elegans*, *Homalota spelæa*.)

Cave-animals.—They form, at least in part, peculiar genera, are wingless and colourless, as far as the consistency of their integuments will admit, and exist exclusively in total darkness. The terrestrial division is blind; the aquatic has a perception of light. To this group belong all the animals in the Mammoth cave, and among those of the caves of Carniola *Anophthalmus*, *Bathyscia*, perhaps likewise *Anurophorus* and *Hypochthon*, which, however, may belong to the following group.

Stalactite-cave-animals.—Insects, Arachnidans and Crustaceans, appertaining to peculiar genera, wingless, blind, brightly coloured, according to the nature of their integuments, either light brown, yellowish, white, or snow-white, perhaps according to the preponderance of the Chitine; living in total darkness, peculiar to stalactite caves, in part occupying the columns and constructed accordingly, either for ascent or hovering over them. Here belong most of the animals treated of in this memoir,—*Stagobius*, *Blothrus*, *Stalita*, *Niphargus* and *Titanethes*.

The circumstance of all the proper cave animals belonging to those groups which feed on prey or else on fermenting vegetable and animal substances, corresponds exactly with the nature of the caves. For, all the caves in which these animals are known to occur, agree in this, that they contain, more or less, running streams, or at any rate accumulations of water, which may be supposed to receive influx from without. It is easy, therefore, to understand how the aquatic animals obtain their food. But water will also carry with it sufficient food for the land animals of the caves, consisting of living and dead animals, and putrid vegetable substances; and these animals may in their turn serve as food for the predatory ones. *Titanethes albus* may be instanced as a link between the outer animals and the predatory animals within, on account of their frequency and mode of living. But it is difficult to understand the mode of life of *Stagobius Troglodytes*; or how this slow and defenceless animal can escape being devoured by the rapid, piratical Arachnidans, or find adequate support on columns, for inhabiting which it is so manifestly constructed. We are led in this respect to consider the antennæ. Whatever signification we attach to those enigmatical organs, we must admit, that they are organs of sense, in which view an animal having them so much developed as *Stagobius*, must possess a great advantage over its enemies, if these be only Arachnidans. Its cautious and slow progress, and its timid reconnoitring demeanour, fully indicate, that it is conscious of life being in perpetual danger, and that it endeavours to the utmost to avoid that danger. Darkness, which always favours the pursued more than the pursuer, comes to its aid, especially on the uneven, excavated surface of the columns. Nor is it difficult to suppose, that it procures sufficient food, more so, perhaps, than is the case with many insects living in the open air; for, the stalactites can scarcely be more void of vegetation, or present generally a more hopeless appearance, as the abode of insects, than the spots on the confines of the snow-line of the Alps, which continue uncovered only a few weeks in summer; or the ashes and lava at the foot of the crater of Vesuvius and Ætna; or the naked sands, washed by perpetual spray from the sea, on the cliffs at the extremity of Skagen. And yet, these lofty Alp-regions are inhabited by not a few peculiar, *wingless* insects; the scanty manure, left on the sides of the volcanos by the mules and horses of travellers, is sought after by a *peculiar* *Aphodius*; and the above-mentioned sandy spots are covered, during the entire summer, by myriads of nests of *Bledius arenarius*.

The predominant part, which articulate animals perform, all over the world, in the terrestrial and fresh-water Fauna, corresponds with the fact, that most of the cave inhabitants belong to that series; while the small number of species, and even of individuals, is easily explained by the poverty of the locality, as regards the conditions favourable for organic life. But if we recollect, that only a few caves have been visited zoologically, that only few naturalists have examined them, and finally, that the animals of the caves of Carniola, which I have described above, were found in the course of half a score days only, and in but one season, we may look upon it as probable, that the number of cave-animals, even those of the caves hitherto actually visited, is far from being exhausted.

EXPLANATION OF THE FIGURES.

PLATE IX.

- Fig. 1. *Stagobius troglodytes*, seen sideways.
 Fig. 2. *Anurophorus stillicidii*.
 Fig. 3. *Stalita teniaria*.
 Fig. 4. *Blotrus spelæus*.
 Fig. 5. *Niphargus stygius*.
 Fig. 6. *Titanethus albus*.

(All reduced from Schiödte's figures.)

The following observations have been communicated by the author, in a letter to Dr. Wallich, as an Appendix to the above Memoir:—

I. I have mentioned a peculiar insect of the family of Locusts as occurring in the caves of Carniola, and in grottos in the vicinity of Syracuse; but I could not do more than barely mention the species, not being in possession of completely developed specimens. I have since learned that the animal has been already described.

In a paper of Dr. H. Fischer (*Beiträge zur Geschichte des Orthopteren-Studiums*, in *Entom. Zeitung*, 10 Jahrg. Feb. 1849, p. 44) I was made aware of the existence of a memoir, which appears to have remained in complete obscurity even in Germany itself, but in which the insect in question is clearly described under the name of *Locusta cavicola*. The author is Vincent Kollar; the memoir is in "Systemat. Verzeichniss der im Erzherzogthume Oestreich vorkommende geradeflügeligen Insecten," and is also inserted in "Beiträge zur Landeskunde Oestreichs unter der Enns," 3d vol., Vienna, 8vo. p. 67. The insect was discovered by Director Schreibers in a small cavern in the vicinity of Baden, called the *Schelmenloch*.

Locusta cavicola is no doubt nearest to the genus *Rhaphidophora*, Serv., differing however in one important point from Serville's character of it, namely, in the structure of the legs, which are *extremely compressed*. Not having had an opportunity of examining any of the species of *Rhaphidophora* described by Serville, Harris, and De Haan, I am unable to point out anything beyond that.

II. My researches concerning the Fauna of the caves were communicated to the Royal Danish Academy of Sciences, at the Meeting of the 25th June, 1847, and a sketch of them was published the same year, in the Academy's Proceedings, No. 6, p. 75, et seq. Through the kindness of Mr. Ferd. Schmidt I have since become acquainted with a quarto paper, published by him (as it appears, a transcript from an Illyrian daily paper), entitled *Naturhistorisches aus Krain* (Communications on Natural History, from Carniola), and dated the 28th December, 1847; in which that zealous and, as respects the Fauna of the caves, very meritorious collector, gives an account of several new objects found there. A new *Anophthalmus*, from the Sele grotto, has now appeared in Sturm's "Deutschlands-Fauna," under the name of *A. Bilimeki* (named after the discoverer, a Cistercian divine). Two other animals likewise mentioned there; *Catops troglodytes* and *Obisium troglodytes*, are probably identical with *Bathyscia byssina* and *Blothrus spelæus*. Mr. Schmidt has likewise met with *Stagobius troglodytes* in the Adelsberg grotto, referring to it under the name of *Leptodirus Hohenwarti*, represented in an annexed lithographic outline. It is mentioned at the same time, that fragments of the animal had already been found, in 1831, by Count Franz von Hohenwart; but that Mr. Schmidt had visited the caves annually, from 1831 to 1846, on purpose to search for it, but in vain. Sturm has now given a good account of this cave-inhabitant in his "Deutschlands-Fauna," but appears not to have been acquainted with my memoir. The anterior tarsi of the male are five-jointed, according to his account; so that my specimens must be all females, and those points, to which I thought I could attach external sexual differences, can only belong to individuals.

III. In a communication from Mr. Freyer mention is made of a new cave-crustacean, *Palomon anophthalmus*, Kollar, said to serve as food for *Hypochthon*; of which last genus he discriminates six species. *Berichte*, &c. (Reports on the Communications of Friends of Natural Sciences at Vienna, edited by William Haidinger, vol. 5, Vienna, 8vo. p. 56.)